SEQUENCE LISTING

<110> Woodhead, Mary Rose Taylor, Mark Andrew Brennan, Rex Michael

<120> BLACKCURRANT PROMOTERS AND GENES

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<151> 1998-11-02

<150> PCT/EP/9604807

<151> 1996-11-04

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| tagtagtaac | tgcaccacca | ccatcagaaa | cagcagagee | agetgeaget | gttgttgccg | 100 |
| accascaca | 22622 | _ | 5 5 5 5 | -googoagee | geegeeg | 120 |
| aggaagagac | aacaaaggag | caagaagagc | cgccagcagt | atcggccgag | gaacctgtgg | 180. |
| ccccagctga | agtagagaca | aaggtggaag | ttacacaaca | accaccaaaa | | |
| 004604+- | | 5 5 - 5 5 4 4 5 | ccacagaaga | accaccaaaa | gttgaggaga | 240 |
| aaccagcaga | agtagaggag | gctccaaagg | aaacagtaga | aacagaacca | gctgttgaga | 300 |
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| _ | 55-5544466 | geagaggact | ctgtcgtgge | acctgctccc | gaaccggaag | 360 |
| ccgaagtccc | aaaagagaag | gtaattgcta | ctactgaaac | tactgaggaa | G22G222 | 400 |
| taacaattaa | 200 | | | caccgaggaa | gaagaaaaag | 420 |
| tggcagttga | agaagttgaa | gtgaaagttg | aaacagagga | gggagaagtt | actgaggaga | 480 |
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| tttataatgt | agtgggcttt | tggtaatatt | tgggggttta | ataagtggtt | taagtgggtt | 600 |
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| aaggcttttt | tggaatttag | atatttgggt | aaaggcctac | ttgaacaaaa | catagaaatt | 660 |
| tggcacacat | gggtaaaagt | caaactttgt | tgaggatgtt | ttcttgttgg | ttaaatgtgt | 720 |
| gtgccaagta | gtagaatgtg | gtggttgtaa | tgtaagttct | caagtagggt | ttatgagtcc | 780 |
| tagtattatg | cttgattgta | tgttgatatg | aaaatggggg | tatgttggct | ttgaataaaa | 840 |
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<213> Ribes nigrum

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| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Glu | ${\tt Glu}$ | Ala | Val | Val | Val | Thr | Ala | Pro | Pro | Pro | Ser | Glu | Thr | Ala | Glu |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Pro | Ala | Ala | Ala | Val | Val | Ala | Glu | Glu | Glu | Thr | Thr | Lys | Glu | G1n | Glu |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Glu | Pro | Pro | Ala | Val | Ser | Ala | Glu | Glu | Pro | Val | Ala | Pro | Ala | Glu | Val |
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| Glu | Thr | Lys | Val | Glu | Val | Thr | Glu | Glu | Pro | Pro | Lys | Val | Glu | Glu | Lys |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Pro | Ala | Glu | Val | Glu | Glu | Ala | Pro | Lys | Glu | Thr | Val | Glu | Thr | Glu | Pro |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Ala | Val | Glu | Lys | Thr | Ile | Lys | Glu | Glu | Thr | Val | Glu | Asp | Ser | Va1 | Val |
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| Ala | Pro | Ala | Pro | Glu | Pro | Glu | Ala | Glu | Val | Pro | Lys | Glu | Lys | Val | Ile |
| | | 115 | | | | | 120 | | | | | 125 | | | |
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| Val | Glu | Va1 | Lys | Val | Glu | Thr | Glu | Glu | Gly | Glu | Val | Thr | Glu | Glu | Lys |
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| tcattgagac | ccagaagagc | tacgatgacg | tcgtggtgat | ggatgttcag | gcagctgaga | 180 - |
| atgatggcaa | gtgcaagtgc | ggcccgagct | gcagttgtgt | gggctgcagc | tgtggtcatt | 240 |
| aagttaaaca | caacattatc | atgttatagt | gaataatgat | gtgtgtgatg | aatataggtg | 300 |
| aaaaatctgt | ggtgtgataa | aaaccgttgg | tgaataaata | ggtgtatatt | tcgtgtgcac | 360 |
| cttctacgag | tacttgtgct | tgttgggtga | aagaaatatg | cacctaagtg | tcagttgttt | 420 |
| tccgtgtttt | tcgccgtgtc | ccttgtaatg | gtcatgtttg | tgttttcttg | tggttaaatt | 480 |
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<212> PRT

<213> Ribes nigrum

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<210> 5

<211> 1046

<212> DNA

<213> Ribes nigrum

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| atacacacgc | aagaagatcc | attgtcttgg | gcaaaaacca | gtcatttact | gctgaaaact | 720 |
|------------|------------|------------|------------|------------|------------|------|
| ttgaagtatt | accaaaacaa | ggccaaactg | gtgtcagtta | cgtccttgaa | cagcattgat | 780 |
| ggaactgtat | gacctaattg | tggcagccga | tgattacaga | aacaatttcc | acaccttttt | 840 |
| tctttttcg | ggcatttgcc | tacattttat | aattaattag | gcattctcat | agctaaggct | 900 |
| cattggattc | acatccctac | ttgtttaaag | gagactttga | tttgttgcct | ccaaacagaa | 960 |
| catatgttgc | tgtgtccatc | agctttttt | aactgggatt | tctatttta | cagtgtgtaa | 1020 |
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<211> 258

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<213> Ribes nigrum

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| Ser | Asp | Arg | Gln | Leu | Arg | Ala | Thr | Val | Gly | Glu | Asp | Gly | Gly | Glu | Arg |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Trp | Asp | Pro | Pro | Leu | Val | Asp | Glu | G1y | Lys | Leu | Arg | Thr | Phe | Arg | Thr |
| | | 35 | | | | | 40 | | | | | 45 | | | |
| Gly | Leu | Lys | Leu | Arg | Thr | Asn | Phe | Asp | Phe | Pro | Ile | His | Arg | Val | Phe |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Val | Ser | Pro | Phe | Leu | Arg | Cys | Val | Gln | Thr | Ala | Ser | Glu | Val | Ile | Ser |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Ala | Leu | Сла | Ala | Va1 | qaA | Asp | Ile | Pro | Ala | Thr | Thr | Asn | Arg | Gly | Asp |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Gln | Val | Gln | Ile | Asp | Pro | Ser | Lys | Ile | Lys | Val | Ser | Ile | Glu | Tyr | Gly |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Leu | Cys | Glu | Met | Leu | Asn | Met | Gln | Ala | Ile | Arg | Leu | Gly | Met | Asp | Phe |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Ser | | Gly | Asn | Trp | Gly | Phe | Asp | Lys | Ser | His | Leu | Glu | Ser | Thr | Phe |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Pro | Val | Gly | Thr | Val | Asp | His | Ser | Val | Glu | Pro | Leu | Tyr | Lys | Glu | Met |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Pro | Lys | Trp | Glu | | Thr | Val | Asn | Gly | | Arg | Ala | Arg | Tyr | Glu | Glu |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Val | Ile | Gln | | Leu | Ala | Asp | Lys | Tyr | Pro | Thr | Glu | Asn | Leu | Leu | Leu |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Val | Thr | | Gly | Glu | Gly | Val | | Val | Ala | Val | Ser | | Phe | Met | Lys |
| _ | | 195 | | | _ | | 200 | | | | | 205 | | | |
| Asp | | Thr | Va1 | Tyr | Glu | Ala | Asp | Tyr | Cys | Ala | | Thr | His | Ala | Arg |
| _ | 210 | | | | | 215 | | | | _ | 220 | _ | _ | | |
| Arg | Ser | Ile | Val | Leu | G1y | Lys | Asn | Gln | Ser | Phe | Thr | Ala | Glu | Asn | Phe |

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<211> 1017

<212> DNA

<213> Ribes nigrum

<400> 7

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<210> 8

<211> 206

<212> PRT

<213> Ribes nigrum

<400> 8

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| Thr | Ala | Leu | Asp | His | Gly | Va1 | Ala | Ala | Val | Gly | Tyr | Gly | Thr | Glu | Asn |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Gly | Val | Asp | Tyr | Trp | Ile | Val | Arg | Asn | Ser | Trp | Gly | Ala | Ser | Trp | Gly |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Glu | Ser | Gly | Tyr | Ile | Arg | Met | Glu | Arg | Asn | Leu | Ala | Gly | Thr | Ala | Thr |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Gly | Lys | Cys | Gly | Ile | Ala | Met | Glu | Ala | Ser | Тух | Pro | Ile | Lys | Lys | Gly |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Gln | Asn | Pro | Pro | Asn | Pro | ${\tt Gly}$ | Pro | Ser | Pro | Pro | Ser | Pro | Ile | Lys | Thr |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Ser | Asn | Ser | Phe | Val | Thr | Ile | Thr | Ile | Pro | Trp | Leu | Lys | Ala | Pro | Leu |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Ala | Ala | Val | Tyr | Leu | Ser | Leu | Ala | Gly | Ile | Ala | Ser | Ser | Gly | Asp | Val |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Ala | His | Ser | Arg | Leu | Pro | Leu | Ala | Val | Met | Thr | Ile | Thr | Val | Ala | Ala |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| His | Met | Ser | Ile | Pro | Ser | Ala | Thr | Leu | Met | Gln | Gly | Arg | Val | | |
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| catgtcgatt | ggtttcactt | caccacagtt | gccatgaaca | actcaaagca | tcgaatttta | 1080 |
|------------|------------|------------|------------|------------|------------|------|
| catgtatatt | atgcaatcta | gatgcttctt | gatatttatt | tttattttt | cttttccaac | 1140 |
| ttttgtaatt | agaattagct | actatggtta | tggcatggag | tgttttataa | ttgctaatat | 1200 |
| catcgtataa | gcaatgctat | ttgagaaatt | gtggtgtaag | gttagagtaa | tgttatttgc | 1260 |
| acaatccact | tacatagacc | gcgggactca | tttaaaaaaa | aaaaaaaaa | a | 1311 |

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<213> Ribes nigrum

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| | M-+ | | | | G | - 7 - | 27. | ~ 1 | a | ~~ T . | ~1 | *** | 35 | 27. | 30 - 1 | m . |
| | | тте | Ala | GIA | | Ile | Ата | GIY | ser | 11e | Glu | HIS | мет | Ата | | Tyr |
| | 1 | 77- T | 7 | ml | 5 | T | m1 | 3 | T1 - | | n 7 - | - 1 - | Q1 | a | 15 | Q |
| | Pro | vaı | Asp | | Leu | Lys | THY | Arg | | GIN | Ата | TTE | GTÀ | | Cys | ser |
| | 37. | ~ 1 | ~ | 20 | ~ 1 | T | 3 | ~ 1. | 25 | . | ~1 | ~ | | 30 | - | ** 7 |
| | Ата | GIN | | Ala | GTĀ | Leu | Arg | | Ala | ьeu | GTA | Ser | | Leu | ьуs | val |
| | Q1 | ~ 1 | 35 | 3.1 – | 01 | T | m . | 40 | ~1 | | a 1 | | 45 | ~1 | - | ~1 |
| | GIU | | Pro | Ата | GIA | Leu | | Arg | GTA | TTE | GTA | | Met | GTĀ | Leu | GTA |
| | | 50 | _ | | | | 55 | | | | | 60 | | | | |
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| | Glu | Thr | Phe | Ser | | Gly | Asp | Pro | Ser | | Ser | Gly | Ala | His | | Val |
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| | Ser | Gly | Va1 | Phe | Ala | Thr | Val | Ala | | Asp | Ala | Val | Ile | Thr | Pro | Met |
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| | | | 115 | | | | | 120 | | | | | 125 | | | |
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| | Phe | Tyr | Ala | Ser | Tyr | Arg | Thr | Thr | Val | Val | Met | Asn | Ala | Pro | Phe | Thr |
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| | Ala | Val | His | Phe | Ala | Thr | Tyr | Glu | Ala | Thr | Lys | Lys | Gly | Leu | Leu | Glu |
| | | | | | 165 | | | | : | 170 | | | | | 175 | |
| | Val | Ser | Pro | Glu | Thr | Ala | Asn | Asp | Glu | Asn | Leu | Leu | Val | His | Ala | Thr |
| | | | | 180 | | | | | 185 | | | | | 190 | | |
| | Ala | Gly | Ala | Ala | Ala | Gly | Ala | Leu | A1a | Ala | Val | Val | Thr | Thr | Pro | Leu |
| | | | 195 | | | | | 200 | | | | | 205 | | | |
| | Asp | Val | Val | Lys | Thr | Gln | Leu | Gln | Cys | Gln | Gly | Val | Cys | Gly | Cys | Asp |
| | | 210 | | | | | 215 | | | | | 220 | | | | |
| | Arg | Phe | Ser | Ser | Ser | Ser | Ile | Gln | Asp | Val | Ile | Gly | Ser | Ile | Val | Lys |
| | 225 | | | | | 230 | | | | | 235 | | | | | 240 |
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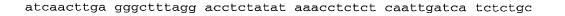
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<211> 3292

<212> DNA

<213> Ribes nigrum

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| gtctctgtac | caaaatacgc | acaccacaaa | aaattctttt | tgtattatat | tcgtttttta | 180 |
| tttttttaac | gttttggtat | tcaaacatca | tataagtaag | ggggaatatt | attcggactc | 240 |
| ctccaaaaac | ttatgacatt | gtgattacac | atttgaatga | cagaagtttt | tgatgaagtg | 300 |
| ccaatatcaa | tcttttctta | attgcttcat | aaagggtgtt | tttgtaatta | aaagaaagat | 360 |
| aaggaaattt | agcaagaagt | gcattattgg | gactggtata | tatgacaagg | atctgacgtg | 420 |
| gcaaagaaag | aaagtgggtc | ctgagtcagg | tgtgtcccat | ctgtcaatat | tcttcaaaag | 480 |
| agagtccacc | atctcataga | tgagatttag | aaagtggttt | ccacaaaaaa | atatgacaca | 540 |
| acccatccat | gaaccaataa | aaacatgaca | ggtcatcatt | tctttctatt | tttttctctc | 600 |
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| ggtgactttt | tattgcccaa | ttgtggcttg | aaggaaataa | aaaggaaagt | ctttttcttg | 720 |
| aacccatatg | gaagcaattt | caatgagaga | gatagagagg | agggatggag | attggggtgg | 780 |
| agaattgata | cggatcttct | ttaattggta | tatgtaaatc | actcagaaac | acgtatacca | 840 |
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| atgcaccaat | catacattat | aacatagtgt | tacgacaata | aaagatcttt | agtcgtaaga | 960 |
| gcattagctc | gtgacaagaa | caaaaacgtg | gattcccaac | ctaaagaagg | gtatatcttt | 1020 |
| tattcatata | tctacttttg | atatgaccta | aaccttgtgt | cacccacaat | gttcagtacg | 1080 |
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| gccggatgtg | atttgggtat | attgatgaca | atataagata | tataaaactt | gaacaaaaca | 1200 |
| atttctcaac | aaattaaact | acaagataat | ctcccttcag | atgataaact | aaatggtaga | 1260 |
| atatccgttg | agtaccccca | ataatttaaa | atctccagca | aatactgtga | ttaatttat | 1320 |
| tcgaagcgaa | attccttcct | tccaaacacc | ttaacaaatg | taaaattcgt | tagtaagatt | 1380 |
| aaatttgaaa | tgataacaca | agagtgaata | aaggtcatgg | tcacctactt | acccaactgc | 1440 |
| acaaaacaca | caagcacaca | tccaaaagta | gtagtatgat | tacacacatt | tgaaaaaatg | 1500 |
| acctccatta | ttttagccac | ctctcttgta | aaaaagatta | caaacaaatt | actcctatca | 1560 |
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| acactctcaa | gcattctttc | tctctacttt | cttttaggtc | aactacactt | ccctttgagt | 1860 |
| ttccaatggc | cactgttgag | gtaaatcaag | tgatatatac | ataaatttta | tttgaaagat | 1920 |
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| taatgtttca | tgttttttta | ttttttgtta | atttttttt | aatttaggca | tttttgcaat | 2040 |
| atcccatttg | tgaaaagatc | tgttttcctt | tggaagagat | tagaattcgt | ttcgtgtcga | 2100 |
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| tccgagcaaa | ctataatcct | caatagtaac | tttgtaatct | ctaaataatc | aaaaaataat | 2280 |
| gcttattggg | gtgattggtg | tgtttgatgc | aggttgtatc | agcgcagaca | gcattccaag | 2340 |
| aggaaaaaaa | acatgatcaa | gaagtaatta | ctacaaaaga | ggaagctgta | gtagtaactg | 2400 |
| caccaccacc | atcagaaaca | gcagagccag | ctgcagctgt | tgttgccgag | gaagagacaa | 2460 |
| caaaggagca | agaagagccg | ccagcagtat | cggccgagga | acctgtggcc | ccagctgaag | 2520 |
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| tagaggaggc | tccaaaggaa | acagtagaaa | cagaaccagc | tgttgagaag | accatcaagg | 2640 |
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| aagagaaggt | aattgctact | actgaaacta | ctgaggaaga | agaaaaagtg | gcagttgaag | 2760 |
| aagttgaagt | gaaagttgaa | acagaggagg | gagaagttac | tgaggagaag | actgagtaaa | 2820 |
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| gaatttagat | atttgggtaa | aggcctactt | gaacaaaaca | tagaaatttg | gcacacatgg | 3000 |
| gtaaaagtca | aactttgttg | aggatgtttt | cttgttggtt | aaatgtgtgt | gccaagtagt | 3060 |
| agaatgtggt | ggttgtaatg | taagttctca | agtagggttt | atgagtccta | gtattatgct | 3120 |
| tgattgtatg | ttgatatgaa | aatgggggta | tgttggcttt | gaataaaagt | ttttaatttt | 3180 |
| atataataag | tgtatttttg | tttaatatca | ttctttcatt | ctctcggatc | aactactgat | 3240. |
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<211> 173

<212> PRT

<213> Ribes nigrum

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Val Thr Ala Pro Pro Pro Ser Glu Thr Ala Glu Pro Ala Ala Val
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                                               45
Val Ala Glu Glu Thr Thr Lys Glu Glu Glu Pro Pro Ala Val
                       55
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Ser Ala Glu Glu Pro Val Ala Pro Ala Glu Val Glu Thr Lys Val Glu
                   70
Val Thr Glu Glu Pro Pro Lys Val Glu Lys Pro Ala Glu Val Glu
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Glu Ala Pro Lys Glu Thr Val Glu Thr Glu Pro Ala Val Glu Lys Thr
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Ile Lys Glu Glu Thr Val Glu Asp Ser Val Val Ala Pro Ala Pro Glu
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                           120
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 Pro Glu Ala Glu Val Pro Lys Glu Lys Val Ile Ala Thr Thr Glu Thr

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| catgtgctct | ccacgaaatt | ccatcacatg | attgttaata | ttttgttctt | tcacactata | 1980 |
| tttattttct | aatatttgtt | cataattcca | cggtaaaaat | ttactttcca | tgagtttcct | 2040 |
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| agcacgtatt | ctcgtaagaa | gaagaagaac | acggagaaaa | gttctcagtt | tttattgata | 2520 |
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<211> 328

<212> PRT

<213> Ribes nigrum

<400> 15

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Val Met Asn Ala Pro Phe Thr Ala Val His Phe Ala Thr Tyr Glu Ala Thr Lys Lys Gly Leu Leu Glu Val Ser Pro Glu Thr Ala Asn Asp Glu Asn Leu Leu Val His Ala Thr Ala Gly Ala Ala Gly Ala Leu Ala Ala Val Val Thr Thr Pro Leu Asp Val Val Lys Thr Gln Leu Gln Cys Gln Gly Val Cys Gly Cys Asp Arg Phe Ser Ser Ser Ile Gln Asp Val Ile Gly Ser Ile Val Lys Lys Asn Gly Tyr Val Gly Leu Met Arg Gly Trp Ile Pro Arg Met Leu Phe His Ala Pro Ala Ala Ala Ile Cys Trp Ser Thr Tyr Glu Ala Ser Lys Thr Phe Phe Gln Lys Leu Asn Glu Ser Asn Ser Asn Ser Ser Val Thr